Zero Retries issue 0052 2022-06-24

Technological innovation in Amateur Radio - Data Communications; Space; Microwave… the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios - Bob Witte K0NR. Ultimately, amateur radio must prove that it is useful for society - Dr. Karl Meinzer DJ4ZC. We are confronted by insurmountable opportunities! - Pogo. Nothing great has ever been accomplished without irrational exuberance - Tom Evslin. Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ. What's life without whimsy? - Dr. Sheldon Cooper.

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

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Request To Send

For Zero Retries readers in the US, have a happy ARRL Field Day!

For Zero Retries readers in Europe, have a great HAM RADIO conference in Friedrichshafen! (I'm enjoying the Twitter posts.) If you are at HAM RADIO this weekend, stop by the ARDC booth (A1-564) and say Hi (from Zero Retries) to Merideth KK7BKI and the rest of the ARDC booth staff.

de Steve N8GNJ

Continuing Zero Retries Interesting Projects, Products, etc. from Zero Retries 0050 and Zero Retries 0051 - Part 3.

Software Defined Receiver / Transmitter / Transceiver (VHF / UHF / Microwave)

ADALM-PLUTO - This is the easiest and most accessible Software Defined Transceiver I'm aware of. It's fully compatible with GNU Radio and thus is a fantastic learning tool… which is its primary audience, though it's used a lot in Amateur Radio.

CaribouLite RPi HAT - An unusual Software Defined Transceiver that will work up to 6 GHz that's optimized in both form factor and function to work with the small, but capable Raspberry Pi Zero 2 W. It was crowdsource funded earlier in 2022, and the developers claim they're on track to begin producing them later in 2022. It looked interesting enough that I have two on order.

Halo TD-XPAH - Radio for 902-928 MHz based on 802.11ah and 802.11s. This also looked interesting enough that I have two on order.

LimeSDR Mini 2.0 - The original version of this Software Defined Transceiver was very popular, but the required components became unobtanium, so it has been redesigned with more readily available (and more capable) components.

KrakenSDR - 5 Software Defined Receivers integrated into a single board and operated on the same USB chain and the same timebase, making it possible to discern signals arriving at different times into the various receivers. Think passive direction finding - no switching between units, no moving antennas. It's my guess that this could probably be made into a very capable multi-band Software Defined Receiver.

Open IP over VHF / UHF - A project (currently in 5 parts - 1, 2, 3, 4, 5) by David Rowe VK5DGR to create a system that will do native TCP/IP over VHF / UHF frequencies, at a data rate of up to 100 kbs, at a range up to 15 km (urban). The transmitter is a Raspberry Pi. The receiver is an RTL-SDR dongle. This system is *mostly software*. It sounds… speculative… but VK5DGR is highly capable, and thus I'm not discounting anything about this project.

RTL-SDR.com Dongles - For a very small premium over the cheap-cheap versions, these Software Defined Receiver dongles are the best ones if you want to experiment inexpensively with Software Defined Receivers.

SDRPlay RSP-1A - My favorite "better than RTL-SDR" Software Defined Receiver. From memory, these can do up to 7 virtual receivers in any contiguous 10 MHz from 1 kHz through 2 GHz.

Space

Space is one of the "big three" raison d'êtres of Zero Retries.

AMSAT - There are now many AMSAT chapters in many countries, each coordinating Amateur Radio satellites and Amateur Radio satellite activity in their respective countries and regions. AMSAT-NA is for North America (and owner of the amsat.org domain), AMSAT-UK is for the United Kingdom, and AMSAT-DL is for Germany.

ARISS / ARISS-USA - One of my proudest boasts as an Amateur Radio Operator is that there are *two* Amateur Radio stations on the International Space Stations, and when not being used for voice contacts with schools, they are often switched into APRS / packet radio digipeater mode, which can be a lot of fun for us data folks. Last year, ARISS-USA was established as an independent entity in the US, and it received a significant grant from ARDC to further their development efforts. One thing I didn't know until recently that ARISS is actively planning for a future for Amateur Radio on space missions / systems *beyond* the International Space Station including private space stations and missions to Luna… and beyond.

CubeSat Simulator is a project by Alan Johnston KU2Y to make it possible to build a demonstration unit of a CubeSat, using 3D printed structural elements, populating a circuit board, and other common electronic components. The idea is to create a unit that can be held in one's hand that illustrates the essential elements of a picosatellite, complete with batteries, solar panel, sensors, and a telemetry transmitter.

FalconSAT-3 is a mostly retired United States Air Force research satellite which included a packet radio store-and-forward Bulletin Board System (BBS) on Amateur Radio frequencies. All official USAF activity has been concluded and now FalconSAT-3's only use is Amateur Radio. Apparently its orbit is decaying, so it won't be with us too much longer.

QO-100 is an Amateur Radio payload (transponder) on the Es'hail 2 geostationary satellite above the Eastern hemisphere. Uplink to QO-100 is on 2.4 GHz and downlink is on 10 GHz. There are many Amateur Radio experiments being conducted on QO-100, and it sure seems like a lot of fun.

SatNOGS is a network of [receive-only] satellite ground stations focused on tracking and receiving low earth orbit (LEO) cubesats, especially those involved in student research. An Amateur Radio license isn't required to participate in SatNOGS as each ground station only receives. SatNOGS publishes how to build a compatible ground station, and some parts can be 3D printed, so a SatNOGS station is an excellent "Maker" project combining electronics, radio technology, and physical construction. There's a very good Frequently Asked Questions page that gets you up to speed fast on SatNOGS.

WSJT-X JT4 / JT65 / Q65 modes - These are just three of the many amazing "Weak Signal Joe Taylor" modes; specifically designed to make it possible for modest Amateur Radio stations to work Earth-Moon-Earth (Moonbounce). Bouncing one's signals off Luna… is just *cool*.

Special Categories

Amateur Radio Digital Television - Amateur Radio has been able to use "fast scan" television since shortly after television became commercially practical. A new generation of Amateur

Radio Television based on digital technology is emerging, and those folks seem to be having a lot of fun!

The PiMod Zero - A pico television transmitter that works with a Raspberry Pi Zero. It's intended to drive legacy analog televisions, but being mostly software, it seems like it could be adapted to (very low power) Amateur Television transmission.

Raspberry Pi Computers - Mostly unobtainium at the moment, but their combination of not very expensive (starting at $15), flexibility, ecosystem support, and power efficiency makes them, in my opinion, the first choice for powering Amateur Radio projects.

Reticulum Network Stack - An amazing amount of work has gone into this project to (as I understand it) use any radio technology to form independent, secure mesh networks. It's not quite applicable to Amateur Radio because of the strong encryption.

For easier reference to all of these items, I have combined the information from Zero Retries 0050, Zero Retries 0051, and Zero Retries 0052 onto a single web page:
Zero Retries Interesting from Zero Retries 0050, 0051, and 0052.

ZR > BEACON

- AREDN production release 3.22.6.0 is now available. Orv Beach W6BI - *This is the release you've been looking for :-) Since the last production release, there have been 136 separate 'pull requests' in the AREDN github repository. Those requests pulled these significant improvements and new features into the AREDN software:*
  1. The conversion from Perl programming to Lua is complete - the result is a significantly smaller, somewhat faster, code base.
  2. Due to the recovered space in the image, tunnels are now always installed, so nothing needs to be done with them during future upgrades.
  3. After this upgrade, future upgrades should be much more reliable, especially on low memory devices.
  4. Tunnels will be prevented from accidentally connecting over the mesh.
  5. You can now adjust the poll rate for alerts. AREDN alerts and local alerts (those yellow banner things you see sometimes) were polled twice a day. This is now configurable.
  6. There is now a 60-second timeout when tunnel connections are interrupted.
  (There are *17 items* of improvement - see the link for details.)

- ARDC is looking for a Director of Technology. My personal summary: An Amateur Radio Operator that has excellent cat herding skills, and mad scientist level (IP) networking skills. It won't be a job, it will be an adventure! I have it on good authority that ARDC is an excellent employer.

- ShaRPiKeebo Update: We Have Liftoff! - *We are now crowdfunding ShaRPiKeebo, a HAT that transforms your Raspberry Pi Zero W or 2W into the ultimate tiny Linux computer. With a physical QWERTY keyboard, a daylight-readable screen, Wi-Fi*

support, and a long-range transceiver, ShaRPiKeebo lets you pack some serious system administration tools (and some not-so-serious games) in your jeans pocket.
The crowfunding cost is $150 per unit and you'll have to furnish your own Raspberry Pi Zero W or Raspberry Pi Zero 2 W, and purchase one of their two battery options. As I write this, they're at 21% of their crowdfunding goal, and Raspberry Pi Zero units are unavailable. I hope this one makes it.

- Beta firmware [for the NinoTNC] with some weak-signal modes - Nino Carrillo KK4HEJ on the ninotnc@groups.io mailing list: *I've posted some new firmware images at https://github.com/ninocarrillo/flashtnc that include weak-signal modes intended primarily for SSB links. We're calling these new firmware images "beta" versions, because we aren't quite ready to include them on the chips we send out in kits. There may be bugs, which we'll do our best to squish over time. The new modes include:*
    - *300 Baud AFSK AX.25 (compatible with HF APRS)*
    - *300 Baud AFSK IL2P (I believe Direwolf already supports this)*
    - *300 Baud AFSK IL2P with rate 1/2 convolution and Viterbi detection (about 150 bps)*
    - *150 Baud AFSK with increased Reed Solomon FEC, block interleaving, and rate 1/2 convolution (about 40 bps)*
- WSJT-X 2.6.0-rc1 - "Andrew OBrien" on the digitalradio@groups.io mailing list: *June 16, 2022 WSJT-X 2.6.0 Release Candidate 1 introduces support for the ARRL International Digital Contest; performance enhancements for FT8, Q65, and EME Echo mode; new controls and options on the GUI; and several bug fixes.*
- PI4 trifecta: VARA, ARDOP & Packet on one audio interface nut cracked - Red R. R. Tuby PE1RRR on the digitalradio@groups.io mailing list: *Hello folks, Thought to contribute to the group with a recent success of getting a RPI to take over doing all of the things at once on one audio interface including VARA running simultaneously as other native Linux modems: The original document with images and a demo video is up here: https://eindhoven.space/radio-experiments/packet-radio/rpi4-trifecta-vara-packet-ardop-one-audio-interface/*

Feedback Loop

- **Jonathan Naylor G4KLX** via Twitter re: my statement in Zero Retries 0048 (DV Fast Data Mode [has not been implemented on]… any of the open source implementations of D-Star.) - *A correction to your blog post. The MMDVM has had Icom fast data mode included for a number of years.*
- **Paul Elliot WB6CXC** via comments on Zero Retries 0051 - *Regarding JS8call, in addition to keyboard chatting, it also provides a one-way APRS gateway. You can send position and status reports, email, phone-text messages, etc to APRS and it gets processed as regular APRS stuff. I have two JS8 rcv-only stations (SDR, RPi, 30 meters*

and 40 meters, one setup in California and the other in Washington), that receive and forward to APRS. The robust (but slow) JS8/FT8 coding and protocol have some real advantages over more traditional ACK/NAK services.
WB6CXC and I exchanged a couple more comments that are worth reading.

- **Larry Gadallah NM7A** re: Zero Retries 0051 mention of Groundsat - *I could have sworn that there was a repeater group in Northern California that had a small network of these running decades ago, but despite quite intensive searches, I could not find any references to it on the Internet, but I did come across this little snippet of prior art: DUNEDIN 2 m LINEAR Repeater.*
  …
  Apropos "there's nothing going on with packet", an unsubstantiated observation from none other than the Northern California Packet Association website: Northern California Packet Association (The Digital Band Planning & Coordination Group of Northern California) Digital Directory.
  NM7A - Thanks very much for those pointers!

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- Pseudostaffer Dan Romanchik KB6NU for continuing to spot, and write about "Zero Retries Interesting" items on his blog that I don't spot on my own.
- Southgate Amateur Radio News consistently surfaces "Zero Retries Interesting" stories.
- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

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More bits from Steve Stroh N8GNJ:

- SuperPacket blog - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted in beautiful Bellingham, Washington, USA
2022-06-24

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